

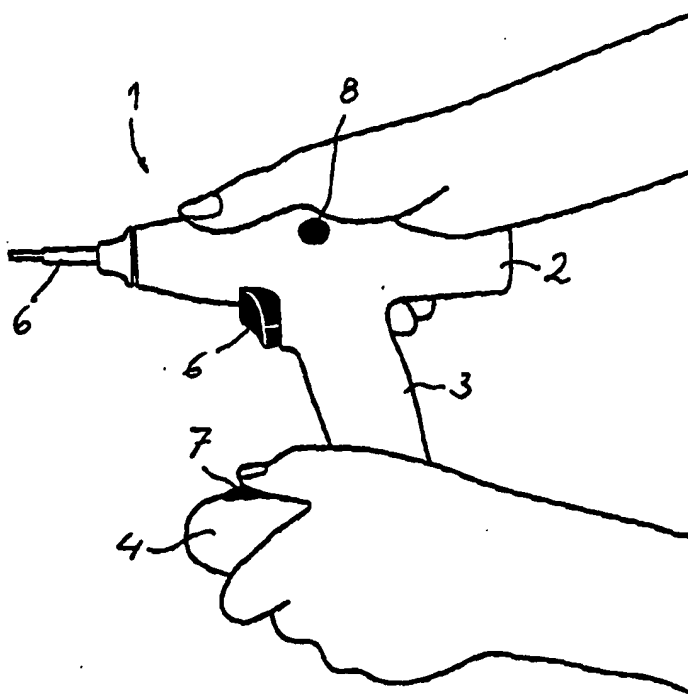


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification <sup>6</sup> :</b> <b>B25F 5/02, B25B 21/00, 23/16, B23B 45/02</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 96/41704</b> <b>(43) International Publication Date:</b> 27 December 1996 (27.12.96)
<b>(21) International Application Number:</b> PCT/SE96/00765 <b>(22) International Filing Date:</b> 12 June 1996 (12.06.96) <b>(30) Priority Data:</b> 9502145-7                      13 June 1995 (13.06.95)                      SE <b>(71) Applicant (for all designated States except US):</b> ERGONOMI DESIGN GRUPPEN AB [SE/SE]; P.O. Box 14021, S-161 14 Bromma (SE). <b>(72) Inventors; and</b> <b>(75) Inventors/Applicants (for US only):</b> GRIEVES, John [SE/SE]; Gamla Lundagatan 6A, S-118 23 Stockholm (SE). TORGRNY, Olle [SE/SE]; Holmgren, Kronobergsgatan 19 ö.g., S-112 33 Stockholm (SE). CRAFOORD, David [SE/SE]; Erik Dahlbergsgatan 30 III, S-115 32 Stockholm (SE). <b>(74) Agents:</b> JANSON, Ronny et al.; Axel Ehmers Patentbyrå AB, P.O. Box 10316, S-100 55 Stockholm (SE).		<b>(81) Designated States:</b> JP, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

**(54) Title:** PORTABLE ELECTRICALLY DRIVEN TOOL**(57) Abstract**

The invention concerns a portable electrically driven tool (1) having a tool housing (2) which contains a drive motor and a transmission connected thereto, an output tool shaft (at 5) for rotational movement and a (first) actuator button (6) for controlling the tool in the forward direction. The invention is distinguished in that at least one separate reverse button (8) for controlling the tool in a reverse direction is arranged on the tool (1).



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## PORTABLE ELECTRICALLY DRIVEN TOOL

5 This invention concerns a portable electrically driven tool according to the preamble of claim 1. Tools that may come into question are, as an example, screw and nut drivers, drills, thread cutting machines and other machines for forward and backward drive.

10 Such tools are previously known wherein a handgrip is connected to a tool housing, said handgrip in a "pistol trigger position" having an actuator button for controlling the motor. Further, adjacent thereto or at an other position on the housing, a direction shift button is arranged for changing the drive of the output shaft in a forward or backward rotation.

15 The use of a particular direction shift button may, however, make it necessary to change hand grip when there is a need of reversing, which leads to loss of time. The arrangement of the direction shift button adjacent the actuator button further leads to a risk of erroneous gear shift and thereby erroneous tool control.

20 It is an aim of the invention according to a first aspect to eliminate this problem. This is achieved in a device according to the above by the feature of the characterizing portion of claim 1.

25 Hereby the possibility of fast and safe reversing without changing grip is achieved, which leads to increased efficiency for the user. The problem concerning which gear is operational is effectively avoided because the backward driving is actuated with a separate reverse button. It should be noted that by the term "reverse button" is intended that this button activates the motor for rotation backwards and not change of gear.

30 The known tools are functioning acceptably with respect to ergonomics in conventional or normal holding and normal use of the tool but does not allow any possibility of holding the tool

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in an alternative way, at least not at any extent that is worth mentioning, in order to achieve particular properties, such as for example better reaching capacity, better working position with respect to ergonomics, i.e. suitable force distribution etc.

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It is an aim of this invention according to a second aspect to eliminate the said disadvantages with devices according to the known art and to provide a portable tool which allows alternative holding of the tool without being bound to a certain predetermined handgrip.

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This aim is obtained in a device according to the above by the feature of claim 2.

15 Hereby freedom in different situations is achieved, for example when drilling or screw driving in positions that are difficult to reach, but also in the normal using position of the device for holding the tool in a handgrip which is more suitable for the situation, as to for example with respect to ergonomics. As an  
20 example, holding with two hands can be mentioned. This is accentuated by the claim 3 feature, by holding with one hand over the tool housing and one hand on the outer end of the handgrip which gives essentially better possibility of taking up pulling impulses which occur in a screw or nut driver e.g. at torque  
25 growth and shut down. Taken as a whole this results in essentially reduced load damages to hands, wrists and forearms.

By the feature of claim 4 it is achieved on the one hand that the counter hold housing which is rigidly connected to the handgrip  
30 in a rotational direction may be used for taking up load at the same time as the hand holding it may be used for controlling the tool motor.

By the feature of claim 5 it is achieved in a simple way that the  
35 counter hold housing becomes a part of the entirety of the tool for taking up the load, which gives a light-weight and slim construction and makes it simple to obtain said rigid arrangement in the rotational direction.

By the feature of claim 6 a preferred embodiment of the tool is provided whereby particularly the tool housing and the battery housing are constructed for comfortable and useful holding and take-up of the above mentioned loads.

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The feature according to claim 7 gives a preferred placing of the second actuator button, which gives possibility of very advantageous control.

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The feature according to claims 8 and 9 allows controlling the respective reverse button with the thumb in a direction which is particularly preferred considering the movement pattern of the thumb.

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The device will now be described in greater detail on hand of an embodiment and with reference to the annexed drawings, wherein:

Fig. 1 illustrates a preferred embodiment of the invention in a side view,

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Fig. 2 illustrates the device of Fig. 1 held in a preferred useful handgrip as to ergonomics,

Fig. 3 shows a detail of a device according to Fig. 1, and

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Fig. 4a and b illustrate the tool of Fig. 1 and 2 in two different perspective views.

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The screw or nut driver 1 of Fig. 1 comprises an elongated tool housing 2, which at about half of its extension is provided with a handgrip 3 extending in a suitable angle in order to form a pistol type grip for the tool housing. At its opposite end the handgrip 3 is provided with a counter hold housing 4, which also is elongated and which has a length somewhat shorter than the

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length of the tool housing 2. The handgrip 3 is connected to the counter hold housing 4 at the rear end thereof, whereby, as seen in a side view, the tool has a shape somewhat reminding of a Z. The sizes of the tool housing and the counter hold housing are

adjusted firstly so as to allow holding by a human hand of normal size. The houses 2 and 4 are rounded bodies, at least partly reminding of ellipsoids, particularly having circular or almost circular cross sections, whereby the length axes of the bodies  
5 are converging somewhat forwards in order to achieve the best handgrip. Also parallel or even somewhat forward diverging axes may also come into question.

The tool comprises in a normal pistol type trigger position a  
10 first actuator button 6 by which the drive mechanism of the tool is controlled and which preferably is provided with a sensitivity which is related to the output rotational speed. On the counter hold body 4 and particularly on its forward side which is turned towards the tool housing 2 there is arranged a second actuator  
15 button 7 which is controllable entirely in parallel with the first actuator button 6 for controlling the tool. As is clear from Fig. 2 this second actuator button 7 can be actuated, for example by the thumb of a hand gripping the counter hold body when using a two hand grip.

20 Further the tool of Fig. 1 is provided with an output shaft having a tool 5 received therein and a first reverse button 8, which is placed on the side of the tool housing which faces sideways from the tool and approximately in level with the front  
25 part of the handgrip 3. This first reverse button 8 is controlled through a displacement along the surface in a direction essentially perpendicular to the output axis (- a in Fig. 1) or in a direction somewhat obliquely forwards downwards (- b in Fig.1), whereby a very advantageous movement pattern for a thumb  
30 of a hand which holds the pistol handgrip is achieved. For adaption to the preferred two hand grip in Fig. 2 the button 8 may be displaced to about in level with the thumb as is shown in the upper part of this Figure. The direction of actuation may in that case be perpendicular to the output axis or somewhat  
35 obliquely downwards rearwards but still along the surface of the tool housing.

With a two hand grip in accordance with Fig. 2 very advantageous

counter action is achieved against the pull impulses occurring at actuation, screw driving or the like as well as at shut down of the drive mechanism. By adapting the controls to this preferred grip, a natural relief from injuries resulting from said impulses is achieved.

Fig 3 shows in greater detail the arrangement of the reverse button 8 and direction of actuation. For accurate adaption of the button, the outward surface may be somewhat inclined in the direction towards the upper side of the tool.

Fig. 4a and 4b show two different perspective views of the tool, whereby a preferred placing of the second actuator button is particularly shown, and in greater detail the shape of the tool housing 2 and the counter hold housing 4. A display 9 is preferably arranged at the rear end of the tool housing 2, which may indicate battery charge status, torque etc.

The counter hold housing 4 is preferably at the same time a battery housing for the tool, whereby the rechargeable batteries are contained therein. In order to change batteries simply, the counter hold housing 4 is preferably divided in parallel to its length extension in such a way that the half which is facing from the tool housing is removable together with the batteries for change of said batteries. Also the handgrip 3 may possibly contain batteries. It is, however, not excluded that the tool according to the invention is powered directly from the net and thus lacks batteries.

## C L A I M S:

1. Portable electrically driven tool (1) having a tool housing (2) which contains a drive motor and a transmission connected thereto, an output tool shaft (at 5) for rotational movement and a (first) actuator button (6) for controlling the tool in the forward direction, c h a r a c t e r i z e d in that at least one separate reverse button (8) for controlling the tool in a reverse direction is arranged on the tool (1).
2. Device according to claim 1, c h a r a c t e r i z e d in that at least one second actuator button (7) for controlling the tool in the forward direction is arranged on the tool at a distance from said first actuator button (6).
3. Device according to claim 1 or 2, c h a r a c t e r i z e d by a handgrip (3) which is connected to the housing, preferably of pistol type.
4. Device according to claim 3, c h a r a c t e r i z e d in that it is provided with a counter hold housing (4), particularly a battery housing, which is arranged rigidly in rotational directions on the opposite side of the handgrip (3) with respect to the tool housing (2) and which carries said second actuator button (7).
5. Device according to claim 3 or 4, c h a r a c t e r i z e d in that the tool housing (2), the handgrip (3) and at least an essential part of the counter hold housing (4) is an integral shell structure.
6. Device according to claim 3, 4 or 5, c h a r a c t e r i z e d in that tool housing (2) and the counter hold housing (4) are elongated, at least partially ellipsoid-like bodies having essentially parallel or somewhat forwards converging symmetry axes.
7. Device according to any of the claims 4 - 6,



c h a r a c t e r i z e d in that (one) said second actuator button (7) is arranged on the side of the counter hold housing (4), which is facing the tool housing (2) in front of the handgrip (3).

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8. Device according to any of the previous claims,

c h a r a c t e r i z e d in that (the first) reverse button (8) is arranged on a surface of the tool housing (2) and/or the counter hold housing (4) which is facing perpendicular to the extension of and essentially in level with the handgrip (3), and that it is actuated by a displacement along said surface.

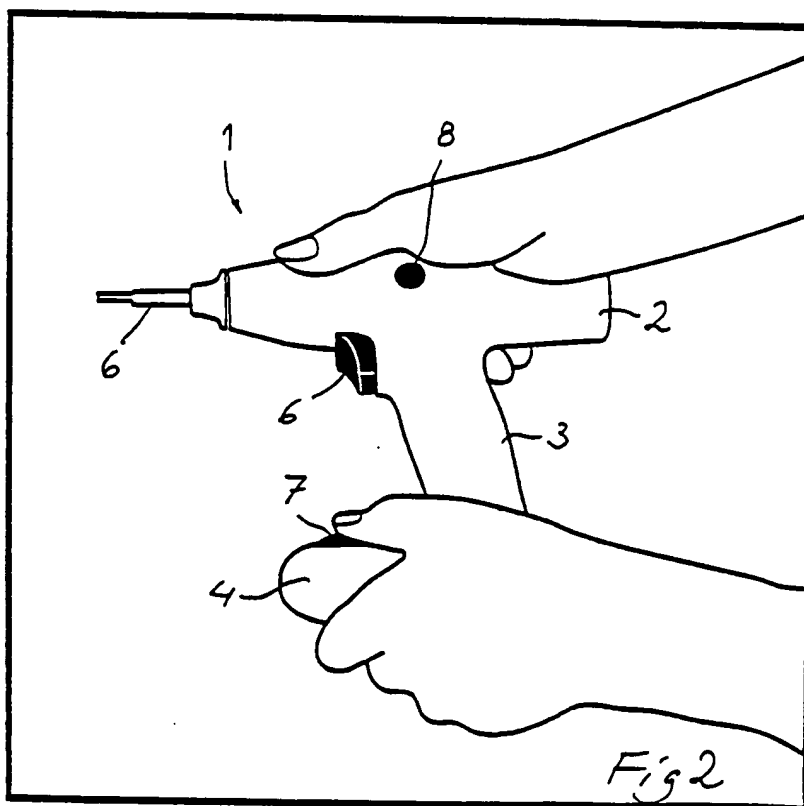
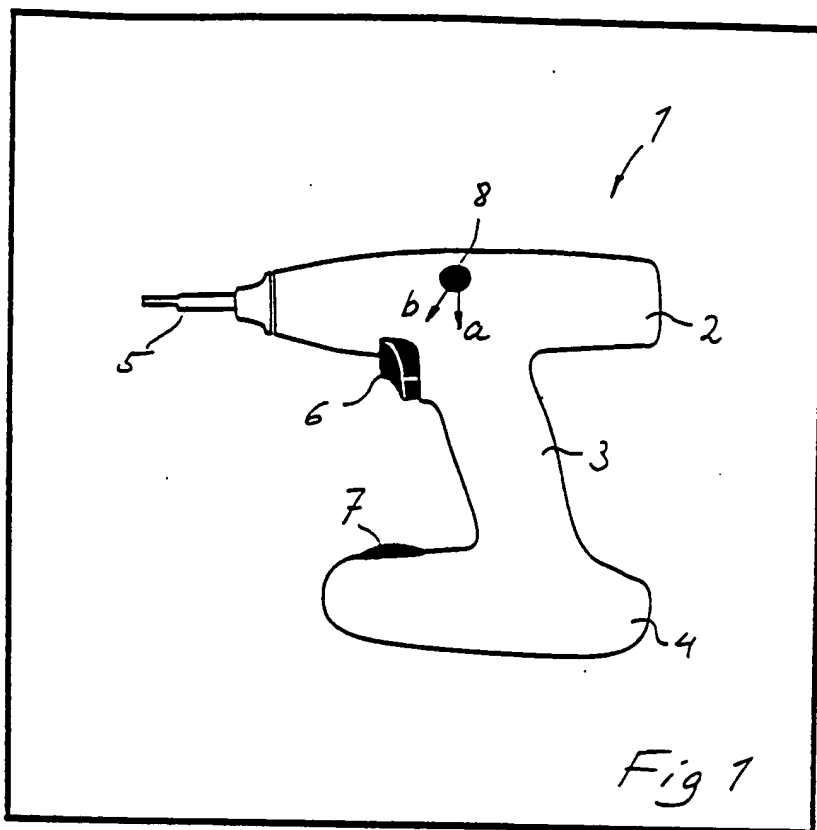
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9. Device according to any of the previous claims,

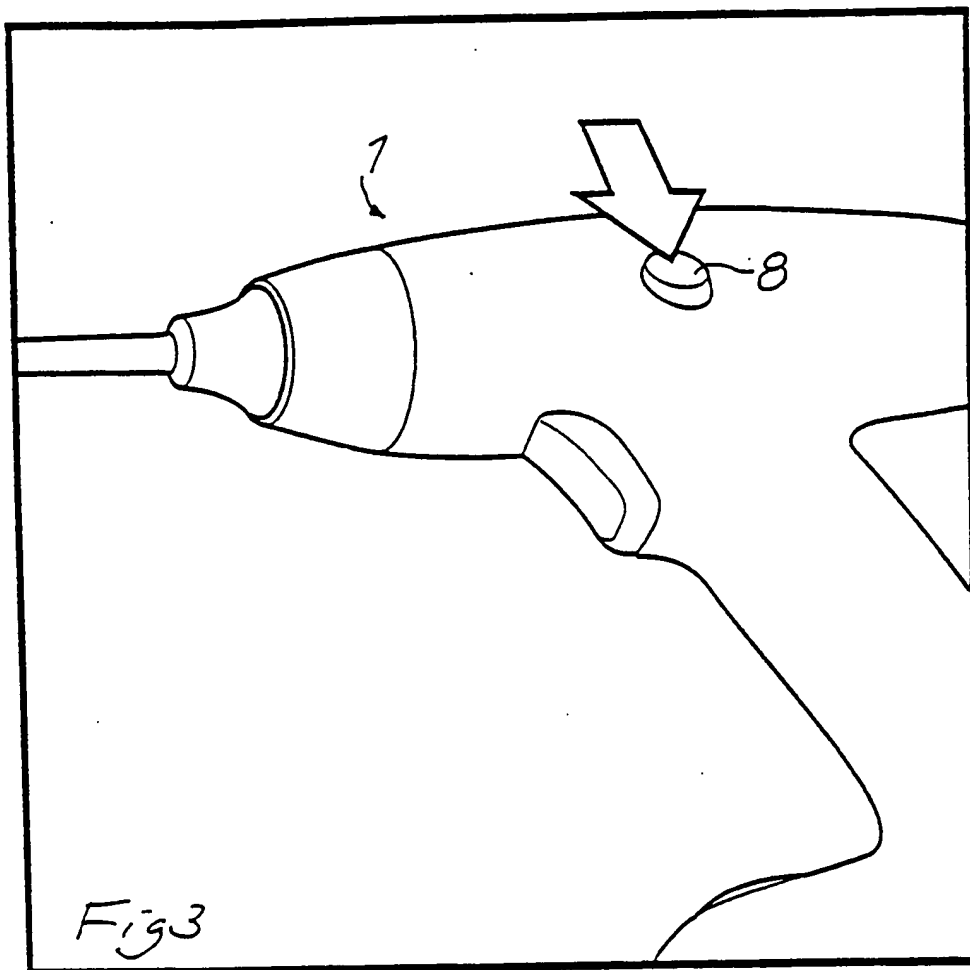
c h a r a c t e r i z e d in that a second reverse button is arranged on a surface of the tool housing (2) and/or the counter hold housing (4) which is directed perpendicular to the extension of and essentially in level with the handgrip (3) at a distance from the place of the first reversing button (8) and that it is actuated by a displacement along said surface.

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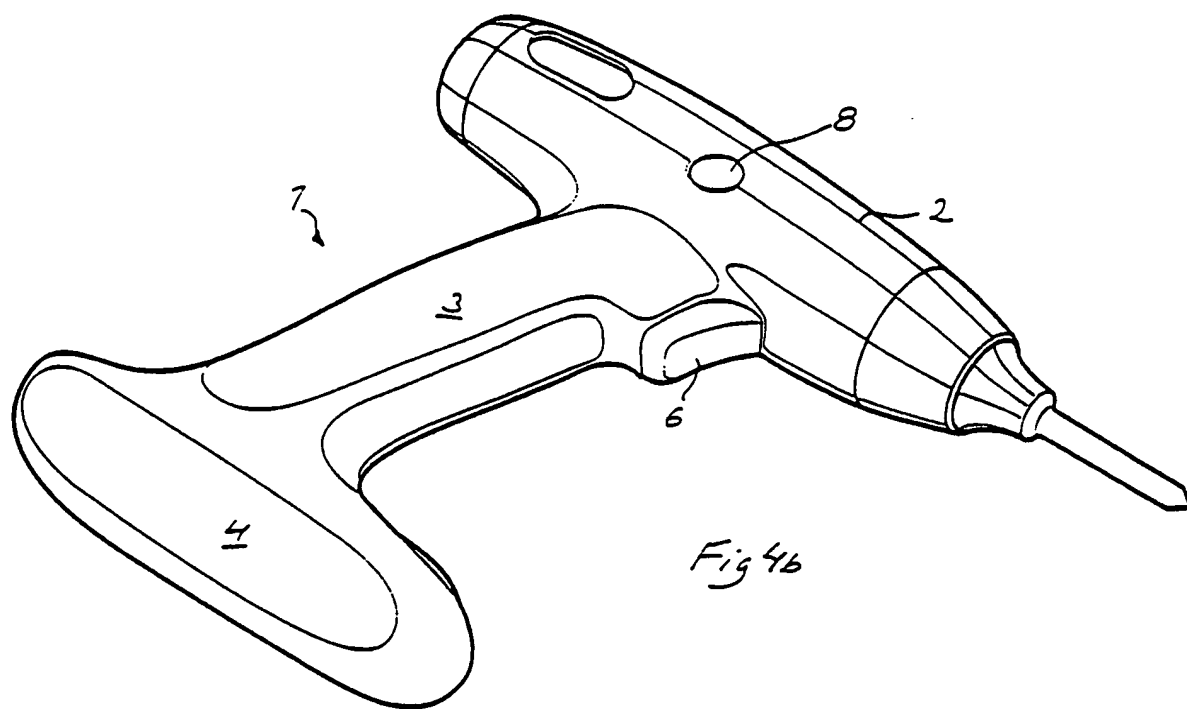
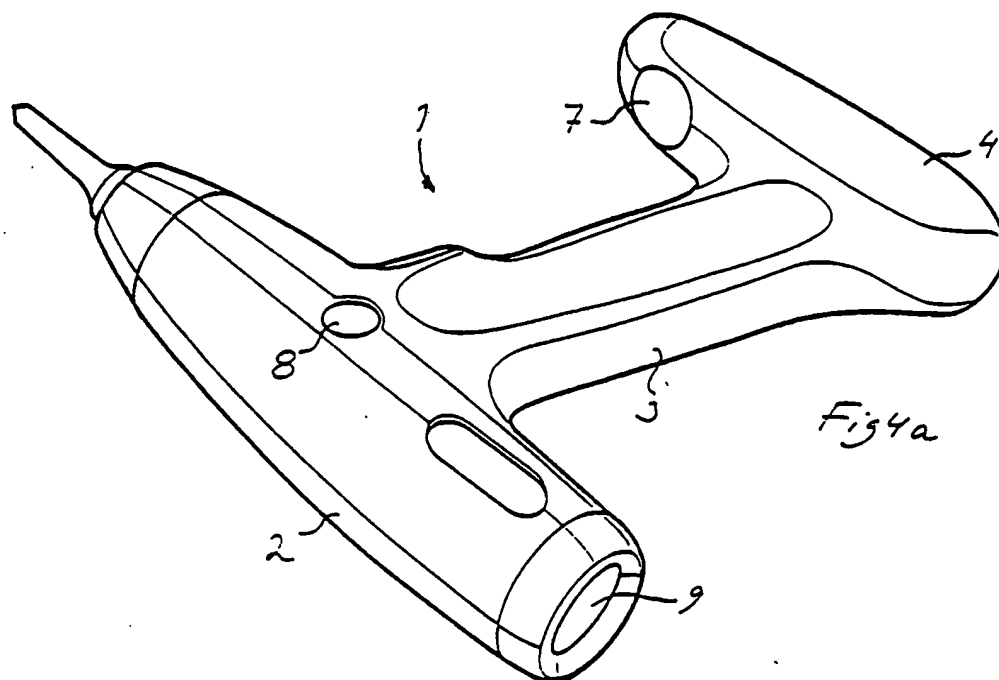
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2/3



3/3



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 96/00765

## A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B25F 5/02, B25B 21/00, B25B 23/16, B23B 45/02  
According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0028029 A1 (BLACK & DECKER INC.), 6 May 1981 (06.05.81), details 16,39,21,13,14,15	1,2,3
Y	--	8
Y	DE 910017 C (E. BEHNERT), 26 April 1954 (26.04.54), figure 1, detail 3	8
A	GB 2239834 A (AB BAHCO VERKTYG), 17 July 1991 (17.07.91)	4
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☐ Further documents are listed in the continuation of Box C.

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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A1- 0028029	06/05/81	AT-E, T- 5693 US-A- 4381037	15/01/84 26/04/83
DE-C- 910017	26/04/54	NONE	
GB-A- 2239834	17/07/91	DE-A- 4100453 JP-A- 4217473 NL-A- 9100006 SE-B, C- 465211 SE-A- 9000080 US-A- 5089738	11/07/91 07/08/92 01/08/91 12/08/91 11/07/91 18/02/92

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